

Potential ARAR	Media	Interpretation for Discussion
Drinking Water MCLs	Surface water	<ol style="list-style-type: none">1. MCLs were appropriately identified as <i>potential</i> ARARs for surface water but should be applied only to the extent that the surface water should be of sufficient quality that it is possible to meet MCLs if conventional treatment methods are applied to surface water withdrawn for public consumption. (This is how DEQ/EPA applied MCLs in the Snake River—Hells Canyon TMDL. It is also consistent with the Oregon Table 340A beneficial use designation of the main stem Willamette “with adequate pretreatment . . .that meets drinking water standards.”). In the context of sediment remediation, this means that, at the end of the project, sediments should not cause concentrations in surface water that exceed MCLs if conventional treatment methods are applied.2. At EPA’s direction, the LWG has addressed a hypothetical risk of using <i>untreated</i> surface water for drinking water in the HHRA. The HHRA compared MCLs to untreated surface water as a screening tool. Using methodology approved by EPA, the HHRA concludes that there are no exceedances of MCLs. Further, it concludes that the only potential drinking water risk that exceeds 10⁻⁶ cancer risk level or a hazard quotient of 1 under this hypothetical scenario is for arsenic, which is likely due to background contributions. Because the risk assessment does not identify even this hypothetical scenario as posing risks, it is not something that, under the Sediment Guidance, should be addressed by an RAO or an ARAR.3. A possible approach is to apply MCLs as ARARs either (1) to surface water to the extent that the surface water should be of sufficient quality that it is possible to meet MCLs if conventional treatment methods are applied to surface water withdrawn for public consumption or (2) to untreated surface water if there are assurances that MCLs would be applied using spatial integration of measurements consistent with the HHRA, which are more consistent with any theoretical drinking water use of surface water.
	TZW	<ol style="list-style-type: none">1. Untreated drinking water consumption of TZW alone would not be a supported beneficial use of the river and MCLs would not be an ARAR under this interpretation..2. Neither the Administrative Settlement Agreement and Order on Consent nor the Scope of Work require the LWG to evaluate remedies for groundwater. Rather, the LWG obligation was to identify source areas, including groundwater, contributing contamination to the in-water portion of the Site and refer those to EPA and DEQ for follow up with respect to upland source control.3. It may be that EPA believes it needs to consider, in areas where there could be a stranded contaminant plume, that there is a potential drinking water use of the groundwater riverward of the MHW line. However, this is a not current and does not appear to be a reasonably likely use. Nonetheless, IF EPA concludes that use of groundwater riverward of the MHW line is a current or reasonably likely use , then MCLs could be ARARs for the ingestion of groundwater for that hypothetical drinking water use. If transition zone water were in the capture zone of a well screened within groundwater beneath the river, then MCLs could be relevant and appropriate at an appropriate point of compliance. If MCLs are relevant and appropriate in this context their evaluation would include spatial averaging consistent with actual exposure that would take place through theoretical withdraw of water from such a well. This averaging should consider the exposure that would theoretically take place from water withdrawn from a constructible well (i.e., at the tap and including the entrainment of surface water through the TZW during such a withdrawal).4. EPA has stated in past discussions that IF MCLs are to be used in TZW, this would only be applied in areas of contaminated groundwater discharge plumes for sites where the RI has gathered relevant data.
	Deep Ground-water	<ol style="list-style-type: none">1. Under EPA’s guidance, RAOs and therefore ARARs should address current and reasonably likely future risks. There are no wells that currently extract groundwater beneath the Willamette River for use as drinking water and there is no evidence that such wells that would capture solely groundwater beneath the river are likely in the future; thus this is not a current and does not appear to be a likely future risk.2. <i>See</i> 2. directly above. IF a hypothetical well were screened in groundwater beneath the river, then MCLs may be relevant and appropriate at an appropriate point of compliance, as discussed above. Evaluation against these criteria would need to include spatial averaging consistent with the actual exposure that would take place from withdrawing water from such a well, which may also include entrainment and withdrawal of surface water. This averaging should consider the exposure that would theoretically take place from water withdrawn from a constructible well (i.e., at the tap).3. EPA has stated in past discussion that IF MCLs are to be used for deep groundwater under the river, this would only be applied in areas of contaminated groundwater discharge plumes for sites where the LWG RI has gathered relevant data.
Bioaccumulation-based Water Quality Criteria (State and/or Federal)	Surface water	<ol style="list-style-type: none">1. Bioaccumulation criteria in surface water (fish and shellfish consumption surface water criteria) may not be relevant and appropriate to a sediment remedy, which has no control over other ongoing sources to surface water (e.g., stormwater and upstream river water). Pursuant to the EPA Sediment Guidance, RAOs (and therefore chemical-specific ARARs) would be established only for objectives achievable by remediation of the site. A bioaccumulation (fish and shellfish consumption) RAO focused on sediment is very appropriate in this case because sediments will be the subject of the project’s remedial actions. Therefore, bioaccumulation-based PRGs and RGs applicable to sediment should be the basis of evaluating remedial alternatives, as is specified in both the Scope of Work (SOW) and the Programmatic Work Plan (PWP). This is consistent with the Oregon cleanup standard, OAR 340-122-0040, which, as applied by DEQ in comparable contexts, is an ARAR. Thus, this is not an “ARAR-free” zone.2. Having separate bioaccumulation criteria for sediment and for surface water would lead to contradictory alternatives evaluations. EPA Sediment Guidance says that the RAOs

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		<p>should follow the methodology of the risk assessment, which is sediment-based for bioaccumulation as specified by the SOW and PWP, so those are the criteria that should be applied. At other sites, EPA has generally either not addressed bioaccumulative surface water criteria at all at sediment sites or identified surface water bioaccumulation criteria as TBCs (e.g., Fox River) or as ARARS that have been waived in the ROD (e.g., Hudson River).</p> <p>3. A possible approach is to identify surface water bioaccumulation criteria as TBCs (as has been done at the Fox River site), to be evaluated in the alternatives analysis of the FS, with the understanding that the sediment bioaccumulation methodology would be primary method for this evaluation and the comparison to TBC surface water criteria would be a secondary line of evidence. If that occurred, comparisons to bioaccumulation criteria would need to be consistent with how those criteria are applied in comparable circumstances by EPA and DEQ. Relevant examples include:</p> <ul style="list-style-type: none">a. EPA’s <i>Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act</i> (2005), which discusses representativeness of measurements in Section IV.2 including spatial and temporal representativeness, comparison to criteria that incorporate averaging, the numbers and spacing of potential nearby sources, flow and other physical conditions of the waterbody, and statistical thresholds for determining exceedances. The guidance also states that “EPA HH criteria for carcinogens are presumed to have a duration of a year or more”; meaning that the concentrations should be above these criteria over this duration for the criteria to be considered exceeded.b. EPA’s <i>Final TMDL for Dioxin Discharges to the Columbia River Basin</i> at 4-1, 4-2, A-3 (1991) (taking into account the harmonic mean flow of the river for carcinogens and the entire lowest 30-day flow in a five-year period for non-carcinogens)c. DEQ’s <i>Reasonable Potential Analysis for Toxic Pollutants Internal Management Directive</i> (2005). <p>That is, point spatial or temporal applications, or even relatively large area and timeframe applications of these criteria would be inconsistent with the human health bioaccumulation scenario that EPA is attempting to protect.</p>
	TZW	<p>1. Bioaccumulation criteria are human health surface water criteria that are not commonly applied in TZW and may not be relevant and appropriate in this context. The criteria are based on human consumption of fish and shellfish that have accumulated contaminants through the food chain as a result of eating prey exposed to the uptake of contaminants from surface water. These criteria are not relevant and appropriate for application to TZW because fish are not exposed to TZW and the uptake of contaminants by shellfish and other biota in TZW does not mimic the uptake from surface water since these biota have processes (such as ventilation of surface water into transition zone water) that modify these organisms’ exposure to this media.</p> <p>2. Sediment PRGs that fully account for this risk pathway are being developed through the food web models, which include the porewater/transition zone component of the sediment and will lead to bioaccumulation-based PRGs for bulk sediment. This is consistent with the Oregon cleanup standard, OAR 340-122-0040, which, as applied by DEQ in comparable contexts, is an ARAR.</p> <p>3. Application of bioaccumulation surface water criteria to TZW is not an approach that has been applied to any sediment site we are aware of.</p>
Chronic Direct Toxicity Criteria (State or Federal)	Surface water	<p>1. Although there is general agreement that this will be an ARAR in surface water consistent with the PWP, the specifics of FS evaluations relative to this criteria still need to be worked out including issues of spatial and temporal averaging, relative contribution from sediment sources, background levels, and ongoing upland source levels.</p>
	TZW	<p>1. These criteria were not developed for benthic organisms and accordingly may not be relevant or appropriate because the benthic organisms’ uptake of contaminants in TZW does not mimic the uptake from surface water since they have processes (such as ventilation of surface water into transition zone water) that modify exposure to this media..</p> <p>2. Bioassay testing in the context of long-term monitoring is an appropriate means of screening for adverse affects to the benthos.</p> <p>3. This risk pathway has been fully evaluated for bulk sediment, which includes the porewater/transition zone component of the sediment, which will lead to sediment PRGs that take into account these exposure pathways. This is consistent with the Oregon cleanup standard, OAR 340-122-0040, which, as applied by DEQ in comparable contexts, is an ARAR.</p>
Acute Direct Toxicity Criteria (State or Federal)	Surface Water	<p>1. The acute criteria are action-specific ARARs that apply during construction and that the appropriate point of application is a specified distance from the operational area of in-water work (e.g., dredging).</p>

- ARAR – Applicable or Relevant and Appropriate Requirement
- BAZ – Biologically Active Zone
- DEQ – Department of Environmental Quality, Oregon
- EPA – Environmental Protection Agency
- FS – Feasibility Study
- HHRA – Human Health Risk Assessment
- LWG – Lower Willamette Group
- MCLs – Maximum Contaminant Levels
- PRG – Preliminary Remediation Goal
- PWP – Programmatic Work Plan
- RAO – Remedial Action Objective
- SOW – Statement of Work
- TBC – To Be Considered
- TMDL – Total Maximum Daily Load
- TZW – Transition Zone Water